PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	31 MAR 2008
Applicant's or agent's file reference 16820.P306PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US05/28791	12 August 2005 (12.08.2005)	04 August 2013 (04.08.2013)

International Patent Classification (IPC) or both national classification and IPC

IPC: **G06F 17/50**(2006.01),**9/455**(2006.01),**9/44**(2006.01)
USPC: 716/1,11;717/107

Applicant

CYPRESS SEMICONDUCTOR CORPORATION

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis(b)* that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450	21 November 2007 (21.11.2007)	/Vuthe Siek/ Primary Examiner for Jack Chiang
Facsimile No. (571) 273-3201		Telephone No. (571) 272-1950

Form PCT/ISA/237 (cover sheet) (April 2005)

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 3, 4, 7, 9-11, 13, 17, 18	YES
	Claims 1, 2, 5, 6, 8, 12, 14-16, 19, 20	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-20	NO
Industrial applicability (IA)	Claims 1-20	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

1. **Claims 1-8, 12-20** are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof:

2. **Regarding claims 1 and 15**, the claims recite, "allowing a user to define a transfer function", and subsequently "submitting the transfer function". The claim requires only that the user be *allowed* to define the transfer function. In the instance where the user does not define a transfer function, the limitation of "submitting" said transfer function is nonsensical. However, as currently written, the claim would require the submission of the transfer function regardless of whether the user has previously defined the function. Therefore, submitting the transfer function should be stated as a conditional procedure dependant on whether the user has exercised the provided ability. See, for example, the language of claim 5.

3. **Regarding claim 12**, the claim includes a similar error to that described in regard to claims 1 and 15 above, although the exact wording of the claim is slightly different. **Regarding claims 2-8, 13, 14, 16-20**, the claims include the above errors in claims 1, 12, and 15 through claim dependency.

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V. 2. Citations and Explanations:

1. **Claims 1, 2, 5, 6, 8, 12, 14-16, 19, and 20** lack novelty under PCT Article 33(2) as being anticipated by NOUTA.
2. **Regarding claim 1**, Nouta discloses:
3. allowing a user to define a transfer function via a graphical user interface (pg.128, section III; pg.130, section VI. Specifically, the transfer function is implemented using a Wave Digital Filter, which is defined in MATLAB using the lwdf2XDK command. MATLAB includes a graphical user interface);
4. submitting the transfer function to a processing device maker associated with a processing device to cause the processing device maker to generate processing device code without intervention by the user (pg.130, section VI; especially, "automatic generation of complete VHDL descriptions is feasible"; also "[f]rom these filter design parameters we calculate the Lattice coefficients and then builds the VHDL description file"), wherein the processing device code causes the processing device to perform the transfer function (pg.128, section III; pg.130, section VI. The VHDL description is used to configure the FPGA in order to implement the transfer function set forth in section III).
5. **Regarding claim 2**, Nouta discloses:
6. providing user interface control on the GUI to allow the user to select a transfer function type and at least one input to the transfer function and to assign an output of the transfer function to each of a plurality of input combinations (pg.128, section III; pg.130, section VI; see also Fig.2. The transfer functions *H(z)* and *H(s)* specify type, inputs, and output. The lwdf2XDK command defines parameters to realize the transfer function.);
7. defining the transfer function in a predetermined pattern based on the transfer function type, the input, and the output (pg.129, section V; pg.130, section VI. The Wave Digital Lattice is a predetermined pattern (thus enabling "automatic generation of complete VHDL descriptions"), with parameters based on the particular transfer function being implemented).
8. **Regarding claim 5**, Nouta discloses:

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9. allowing the user to modify the transfer function via the GUI (pg.130, section VI); and
10. in response to modification of the transfer function by the user, automatically regenerating the processing device code using the processing device maker (pg.130, section VI. Modification by the user is done by entering the lwdf2XDK command using different parameters; the command results in compilation of the VHDL description.).
11. **Regarding claim 6,** Nouta discloses validating and simulating the transfer function (pg.128, section III; see also Fig.2, "[p]lot of [transfer function] to check whether the design specifications are met.". The examiner understands "validation" to be determining whether the transfer function is even a valid function, whereas simulation implements the proposed function in order to check its adherence to expected performance. As such, Fig.2 constitutes both validation and simulation, because the plot is made to check whether design specifications are met, and the plot could not be made without a valid transfer function. Thus, attempting to make such a plot involves both validation (checking whether a plot is even possible), and simulation (checking plot with design specification).) without running the processing device (pg.128, section III, Fig.2. The plot is made prior to implementation of the transfer function on FPGA).
12. Furthermore, simulation of FPGA designs at the VHDL level is well-known in the art and is included in the Virtex-II Pro development package (Nouta discloses use of e.g., the ISE 5.2i development kit on pg.130, section VI). Also, MATLAB is well-known to be able to compute properties of mathematical functions, including transfer functions. Such a computation would constitute simulation of the transfer function without running the processing device, as such a computation would be done by the host processor in the computer, rather than the FPGA the function is ultimately implemented on.
13. **Regarding claim 8,** Nouta discloses the transfer function comprising a setpoint transfer function (pg.129, section V. A Wave Digital Filter representation digitizes the continuous transfer function. This is consistent with applicant's description of a "setpoint transfer function" as set forth in par. [0025] of the specification).
14. **Regarding claim 12,** Nouta discloses:
15. a graphical user interface to allow a user to define a transfer function via the GUI (pg.128, section III; pg.130, section VI. Specifically, MATLAB has a GUI that allows the user to define a transfer function); and
16. a processing device maker logically coupled to the GUI to generate processing device code based on the transfer function without intervention by the user, wherein the processing device code causes a processing device to perform the transfer function when executed by the processing device (pg.128, section III; pg.130, section VI. The VHDL tool is invoked through a MATLAB command, and thus is 'logically coupled' to the MATLAB GUI. See also reasoning regarding claim 1 for further clarification.).
17. **Regarding claim 14,** the limitations are substantially similar to the limitations recited in claim 5, which was found above to be unpatentable over the prior art of record. Accordingly, the same reasoning applies and is not reproduced here.
18. **Regarding claim 15,** the claim is directed to a machine-readable medium providing instructions to perform the method of claim 1, wherein the body of the claim is identical to claim 1. Claim 1 was found above to be unpatentable over the prior art of record; accordingly, the same reasoning applies and is not reproduced here. In regard to the additional limitation of the machine-readable medium, although Nouta does not appear to explicitly disclose such a medium, Nouta discloses computer programs (e.g., MATLAB) used to perform the disclosed method. Such programs must necessarily be stored on some form of machine-readable medium, and therefore such a medium is inherently included in the disclosure of Nouta.
19. **Regarding claims 16 and 19,** the claims are directed to a machine-readable medium providing instructions to perform the methods of claims 2 and 5, respectively, wherein the body of each of claims 16 and 19 is identical to claims 2 and 5, respectively. The additional limitation of the machine-readable medium is addressed above in regard to claim 15. Claims 2, 5, and 15 were found above to be unpatentable over the prior art of record; accordingly, the same reasoning applies and is not reproduced here.
20. **Regarding claim 20,** the claim is directed to a machine-readable medium providing instructions to perform the method of claim 6, wherein the body of the claim is identical to claim 6. The additional limitation of the machine-readable medium is addressed above in regard to claim 15. Claims 6 and 15 were found above to be unpatentable over the prior art of record; accordingly, the same reasoning applies and is not reproduced here.
21. **Claims 3-4, 13, 17, and 18** lack an inventive step under PCT Article 33(3) as being obvious over NOUTA in view of ALLISON.

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22. **Regarding claim 3**, Nouta does not appear to explicitly disclose a ROM image. However, Nouta discloses configuring an FPGA (pg.130, section VI; especially, "the resulting bitfile is downloaded into the FPGA".). It is well-known in the art that configuration of FPGAs uses ROM images, as exemplified by Allison (par.[0022], [0023]; especially, "A ROM image may be viewed as a binary file" (i.e., bitfile), and "[d]ata images each may be ... Field Programmable Gate Array (FPGA) configuration code"). Accordingly, the use of a ROM image requires that the ROM image first be generated; the bitfile disclosed by Nouta is generated using the VHDL description, which is inputted through synthesis and routing tools (p.130, section VI; see also Fig.6).
23. It would be obvious to persons having ordinary skill in the art at the time the invention was made to combine the teachings of Nouta with the teachings of Allison to arrive at the claimed invention, because doing so would involve merely a combination of known components according to known methods to produce an expected result (a ROM image for configuration of FPGAs).
24. **Regarding claim 4**, Nouta in view of Allison disclose or render obvious the limitations addressed above in regard to claims 1 and 3. The further limitation of loading the ROM image into the processing device is rendered obvious by the reasoning presented in regard to claim 3. Specifically, if the FPGA configuration file is stored as a ROM image, configuration of the FPGA as disclosed by Nouta requires that the ROM image be loaded, either directly or indirectly, onto the FPGA. Accordingly, the motivation to combine Nouta and Allison remains consistent with that given in regard to claim 3, and is not reproduced here.
25. **Regarding claim 13**, the limitations are substantially similar to the limitations recited in claims 3 and 4, which were found above to be unpatentable over the prior art of record. Accordingly, the same reasoning applies and is not reproduced here. Specifically, the reasoning regarding claim 3 addresses the generation of the ROM image, and claim 4 addresses the loading of the ROM image into the processing device.
26. **Regarding claims 17 and 18**, the claims are directed to a machine-readable medium providing instructions to perform the methods of claims 3 and 4, respectively, wherein the body of each of claims 17 and 18 is identical to claims 3 and 4, respectively. The additional limitation of the machine-readable medium is addressed above in regard to claim 15. Claims 3, 4, and 15 were found above to be unpatentable over the prior art of record; accordingly, the same reasoning applies and is not reproduced here.
27. **Claim 7** lacks an inventive step under PCT Article 33(3) as being obvious over NOUTA in view of SAYLOR.
28. Nouta does not appear to explicitly disclose a "truth table transfer function". However, such transfer functions are notoriously well known in the art, as exemplified by Saylor (col.2, lines 33-43). The "lookup table" is in accordance with Applicant's description of "truth table" given in par. [0025] of the specification.
29. It would be obvious to persons having ordinary skill in the art at the time the invention was made to combine the teachings of Nouta and Saylor, because doing so would involve merely substitution of one known, equivalent element for another (lookup table transfer function for setpoint transfer function) in order to obtain predictable results (implementation of the lookup table transfer function).
30. **Claims 9-11** lack an inventive step under PCT Article 33(3) as being obvious over NOUTA.
31. **Regarding claim 9**, Nouta discloses:
32. allowing a user to program a processing device to cause the processing device to perform a transfer function without the user writing processing device code (pg.128, section III; pg.130, section VI. See also reasoning regarding claim 1 for further clarification.); and
33. allowing the user to modify the transfer function without the user editing the processing device code (pg.130, section VI. See also reasoning regarding claim 5 for further clarification.).
34. In addressing the limitation of "means for", Examiner interprets Applicant's disclosed means as being the generic computer system as shown in Applicant's Fig.4. Although Nouta does not appear to explicitly disclose a computer system, the method disclosed by Nouta utilizes computer programs such as MATLAB and ISE 5.2i and thus the "means" claimed by applicant are at least implied by, if not inherent in, the disclosure of Nouta.
35. **Regarding claim 10**, Nouta discloses receiving inputs from the user (pg.130, section VI); and defining the transfer function based on the inputs (pg.128, section III; pg.130, section VI. See also reasoning regarding claim 2 for further clarification.). The limitation of "means for" is addressed above in regard to claim 9.

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36. **Regarding claim 11**, Nouta discloses automatically generating the processing device code based on the transfer function (pg.128, section III; pg.130, section VI. See also reasoning regarding claim 1 for further clarification.). The limitation of "means for" is addressed above in regard to claim 9.
Claims 1-20 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.